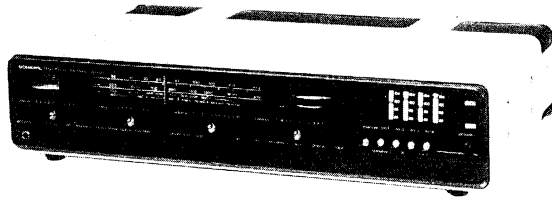




SERVICE MANUAL

Hi-Fi MW/LW/SW/FM Stereo Receiver MODEL TFS-70



Germany: TELETON Elektro GmbH.
4000 Düsseldorf-Rath Oberhausener Str. 17
Tel. (0211) 65 30 81 TX 858 6768

United Kingdom: TELETON Electro (UK) Co., Ltd.
Teleton House, Waterhouse Lane,
Chelmsford/Essex
Tel. Chelmsford 62 442 TX 99 338

Technical Service Organization
Waterhouse Lane, Chelmsford, Essex.
Tel. 0245-54621 TX 99338

Belgium: TELETON N.V.
2200 Borgerhout Belgium
Prins-Leopold-Straat 28
Tel. 03/361045 TX32508
03/357670

Netherlands: TELETON NEDERLAND B.V.
Marconiweg 10. Vianen
Tel. 03473-3744 TX 40581

France: TELETON Electro (France) S.à.r.l.
21 rue Paul Lafargue
94270 Le Kremlin-Bicêtre
Tel. 677 6934 TX24 468

Switzerland: TRANSACO AG
Kanzleistrasse 126 8004 Zürich
Tel. 39 45 60/23 50 40 TX 52 362

CABINET EXPLODED VIEW

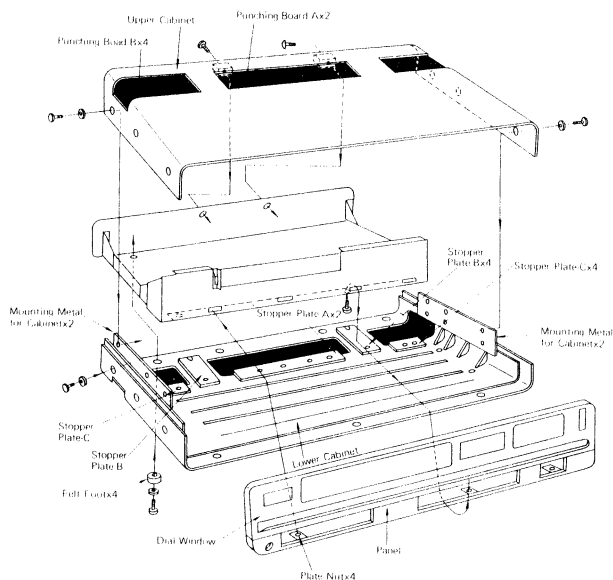


Figure 1

CABINET REMOVAL

1. Remove six screws on the cabinet sides.
2. Remove two screws on the cabinet rear.
3. Pull backward the upper cabinet, then this will be removed.
4. Remove all screws (includes foot screws), then the lower cabinet will be removed.

ADJUSTMENT INSTRUCTIONS

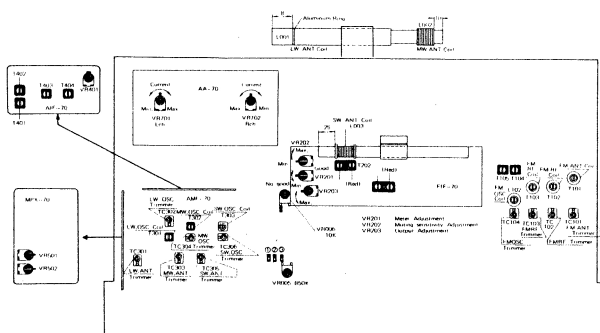


Figure 2

1. Adjustment of Main Amp.

When transistors Q711, 712, 713, 714 are exchanged, the following adjustment is necessary:

1-1 Measuring Equipment

- (a) Current Meter

1-2 Condition of the Set

- (a) Treble Middle Position
(b) Bass Middle Position
(c) Volume Minimum
(d) Balance Middle Position
(e) Muting, AFC, Loudness, Tape, Low, High OFF Position

(f) ST/MONO ST

(g) Mode AUX

(h) Speaker A

(i) Quad ST

1-3 Adjustment

- (a) Adjust VR701, VR702 to middle position.
(b) Connect the Current Meter ⊕ Side to Terminal 3(Rch.) or 4(Lch.) on the Fuse Board A, and the Current Meter ⊖ Side to Terminal 1(R ch) or 2(L ch).
(c) Adjust VR702 to 40 mA ±3 mA.
(d) Set the Current Meter to L Channel.
(e) Adjust VR701 to 40 mA ±3 mA.
(f) Repeat Procedure a - d several times.

2. AM IF Adjustment

2-1 Measuring Equipments

- (a) AM Standard Signal Generator
(b) Audio Oscillator
(c) Output Meter (V.T.V.M)
(d) Oscilloscope
(e) Dummy Load 8Ω 50W

2-2 Preparation of Adjustment

- (a) Volume: Max., Mode: MW, Others: same as procedure 1-2
(b) Measuring Connection is as follows:

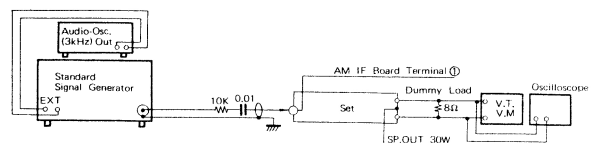


Figure 3

2-3 Adjustment

- (a) Set S.G. to 465 KHz (Mod. 400 Hz 30%) 80 dB, and adjust IF cores of T401, T402, T403 and T404 for maximum output reading.
Adjust the Attenuator of S.G. according to increase the output, and put the output reading to 500 mW (2V) approx.

(b) Set S.G. to 465 KHz (Mod. 3000 Hz 30%), and adjust cores of T401 and T402 for maximum output reading.

3. AM Tracking Adjustment (Adjusting procedure for LW, MW, and SW)

3-1 Measuring Equipments

- AM Standard S.G. (including loop antenna)
- Output Meter (V.T.V.M.)
- Oscilloscope
- Dummy Load 8Ω 50W

3-2 Preparation of Adjustment

- Volume: Max., Mode: LW, Others: Same as procedure 1-2
- Measuring connection is as follows:

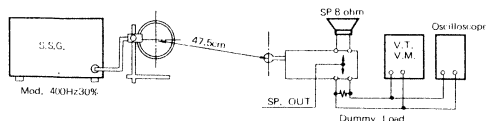


Figure 4



Figure 5

- TC301, TC302, TC304, TC305 and TC306 Position are as shown in Figure 5.
- Set the Aluminium ring of L001 (Ant. coil) as shown in Figure 2.
- Set L002 (Ant. coil) as shown in Figure 2.
- Set L003 (Ant. coil) as shown in Figure 2.

Note: All adjustments for max. Output.

3-3 LW Tracking Adjustment

3-3-1 Adjustment of Local Osc. circuit

Adjustment Step	1	2
Frequency (S.G.)	145 KHz	350 KHz
V.C. Position	Max. Capacitance	Min. Capacitance
Adjust Point	T301	TC302

Repeat Step 1 and 2 several times. When step 1 and 2 match, adjustment of the Local Osc. Circuit is finished.

3-3-2 Adjustment of Tuning Circuit

Adjustment Step	1	2
Frequency (S.G.)	160 KHz	320 KHz
V.C. Position	160 KHz Tuning Position	320 KHz Tuning Position
Adjust Position	Aluminium Ring	TC301

Repeat step 1 and 2 several times. When step 1 and 2 match, adjustment of tuning circuit is finished. Fix the Aluminium ring with wax, and adjust finely the Local Osc. Circuit (because the coverage drag by the Tracking adjustment.)

3-4 MW Tracking Adjustment (Mode: MW)

3-4-1 Adjustment of Local Osc. Circuit

Adjustment Step	1	2
Frequency	515 KHz	1710 KHz
V.C. Position	Max. Capacitance	Min. Capacitance
Adjust Position	T302	TC304

3-4-2 Adjustment of Tuning Circuit

Adjustment Step	1	2
Frequency	600 KHz	1400 KHz
V.C. Position	600 KHz Tuning Position	1400 KHz Tuning Position
Adjust Position	L002	TC303

3-5 SW Tracking Adjustment (Mode: SW)

3-5-1 Adjustment of Local Osc. Circuit

Adjustment Step	1	2
Frequency (S.G.)	5.8 MHz	12.5 MHz
V.C. Position	Max. Capacitance	Min. Capacitance
Adjust Position	T303	TC306

3-5-2 Adjustment of Tuning Circuit

Adjustment Step	1	2
Frequency (S.G.)	7 MHz	11 MHz
V.C. Position	7 MHz Tuning Position	11 MHz Tuning Position
Adjust Position	L003	TC305

4. FM, IF Adjustment (FM, IF Adjustment is adjusted with S Curve.)

4-1 Measuring Equipment

- 10.7 MHz Interscope (Sweep generator and scope)

4-2 Preparation of Adjustment

- Mode-FM, Others ----- same as procedure 1-2
- Measuring connection is as follows:

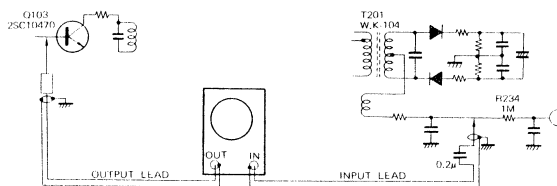


Figure 6

- Keep output lead and input lead at a distance.
- Ground of the output & input lead should be done near point of hot side.

4-3 Adjustment

- In condition of Figure 6, adjust vertical gain (80 dB ATT.) for approx. 1/3 height output wave form. Output wave form on the Interscope is as shown in Figure 7.

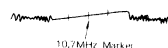


Figure 7

- Adjust black core and red core of T201 to obtain the wave form as shown in Figure 8.

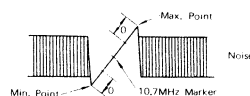


Figure 8

Note: See Figure 9.

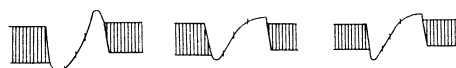


Figure 9

(c) Adjust cores of T105 & T104 to obtain Figure 10.

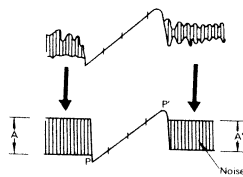


Figure 10

Note: 1. Take the height of A & A' as long as possible.
2. Inequality of noise (See figure 11) is no good.

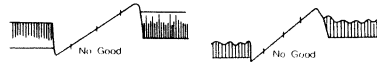


Figure 11

5. FM Tracking Adjustment (do not remove the tuner cover.)

5-1 Measuring Equipment

- FM Standard Signal Generator (include the pad)
- Output Meter (V.T.V.M.)
- Oscilloscope
- Distortion Meter
- Dummy Load 8Ω 50W

5-2 Preparation of Adjustment

- Volume ----- Max. Mode ----- FM
- Measuring connection is as follows.

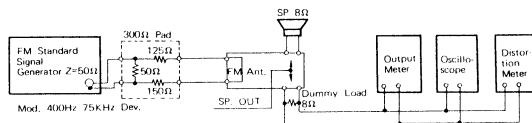


Figure 12

(c) TC101, TC102, TC103 and TC104 position are as follows.



Figure 13

- Set VR201, VR202, VR203, VR005 and VR006 to mechanical center position.
- Set Pre-Setter to MANUAL.

5-3 Adjustment

5-3-1 Adjustment of Local Osc. Circuit

- Connect ⊕ terminal of Voltmeter to VR007 2 terminal, and ⊖ terminal of Voltmeter to chassis.
- Set tuning to max. and adjust VR005 for 8V Voltmeter scale.
- Set tuning to min. frequency and adjust VR006 for 1.5V Voltmeter scale.
- Repeat step (b) and (c) several times. When step (b) and (c) match, voltage adjustment is finished.
- Adjustment of tuning circuit

Adjustment Step	1	2
Frequency (S.G.)	87.5 MHz	104.5 MHz
Freq. Position	Min. frequency	Max. frequency
Adjust point	L102	TC104

Adjust for max. output.

Repeat step 1 and 2 several times. When step 1 and 2 match, adjustment of the Local Osc. Circuit is ending.

5-3-2 Adjustment of Tuning Circuit

Adjustment Procedure	1	2
Frequency (S.G.)	90 MHz	102 MHz
V.C. Position	90 MHz Tuning Position	102 MHz Tuning Position
Adjust Point	T101, T102, T103	TC101, TC102, TC103

6. Adjustment of Meter, Muting, Tape Output Circuit

Note: Adjustment of Tape Output Circuit should be done after MPX adjustment.

6-1 Adjustment of Meter

- Input 90 MHz (Mod. 400 Hz, 22.5 kHz Dev.) 32dB (Att. scale), and adjust red and black cores of T202 for max. Meter scale.
- Set S.G. Att. scale to 112dB, and adjust VR202 for 8 meter scale.

6-2 Adjustment of Muting Circuit

Input 90 MHz (Mod. 400 Hz, 22.5 kHz Dev.) 32dB (Att. scale), and set Muting Switch "ON". Turn VR201 counterclockwise to end (mute the output), and turn clockwise to the point of which the output wave appears, then set the point of which turn clockwise slightly.

6-3 Adjustment of Tape Output Circuit

Input 90 MHz (Mod. 400 Hz, 22.5 kHz Dev.) 72dB (Att. scale), and adjust VR203 for 45 mV output of TAPE OUT.

Note: Insert 47k ohm resistor to TAPE OUT as suspected load.

7. MPX Adjustment

7-1 Measuring Equipment

- FM Standard Signal Generator (S.G.)
- STEREO Signal Generator (MPX S.G.)
- V.T.V.M.
- Oscilloscope
- Counter
- Dummy Load 8Ω 50W

7-2 Preparation of Adjustment

- Volume, Balance ----- Adjust output of L ch. and R ch. for 500mmW (2V).
Mode ----- FM Others ----- Same as procedure 1-2.
- Measuring connection is as follows:

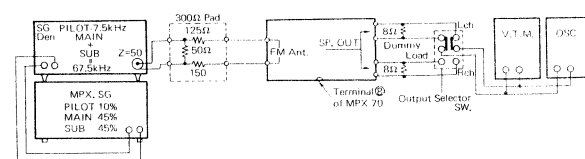


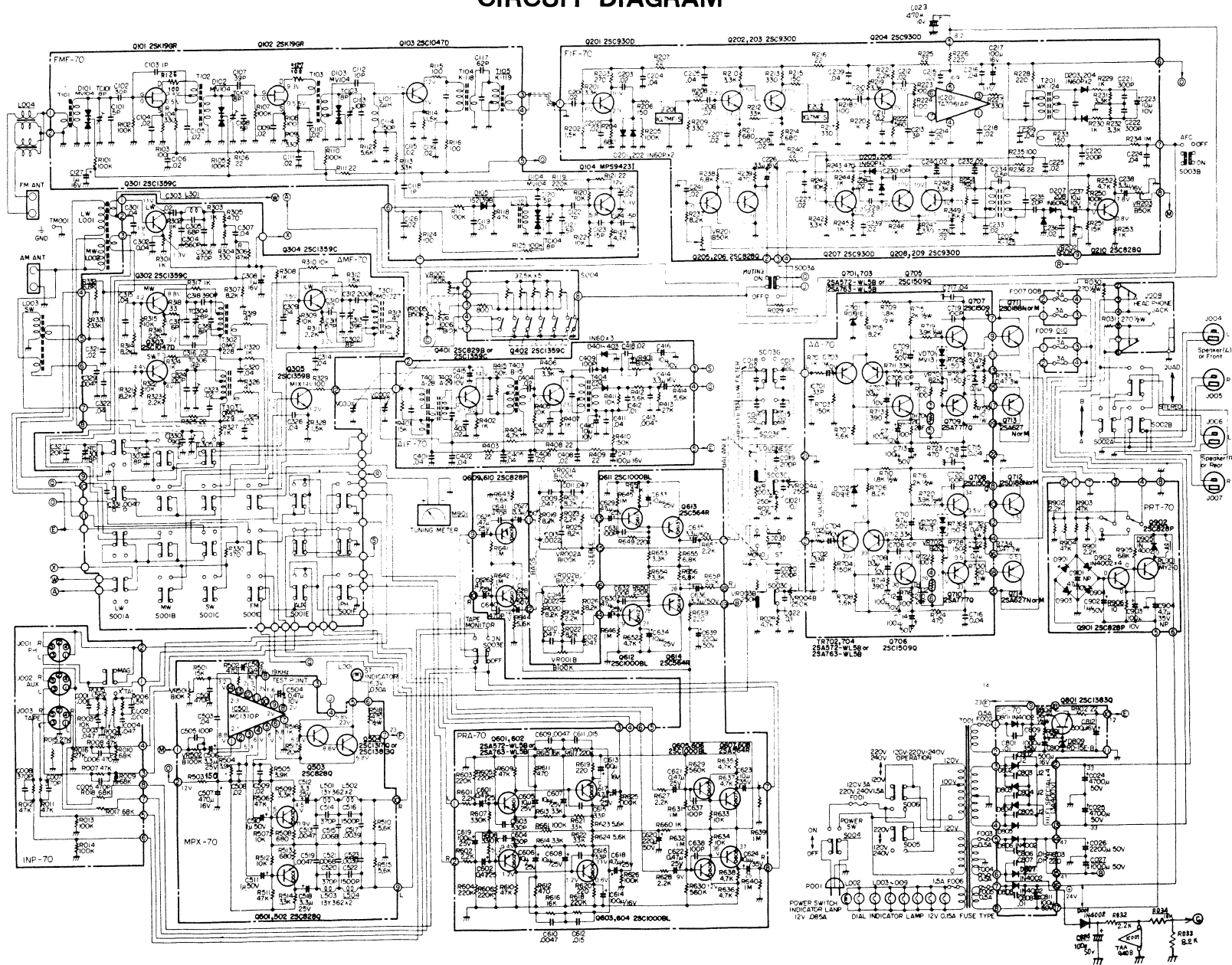
Figure 14

(c) Adjust VR501 & VR502 to middle position.

7-3 Adjustment

- Set S.G. to 90 MHz (L+R) + PILOT 32 dB.
- Tune set to 90 MHz.
- Adjust Volume & Balance for 500mmW SP. output of both channel.
- Select (L+R) of MPX S.G. to "SUB". (ST. lamp not light.)
- Adjust VR501 for max. and no-distortion "SUB" waveform.
- Set MPX S.G. to R signal, and Output Selector SW. to L ch. (leakage of R signal appears on V.T.V.M.) Then, adjust VR502 for min. leakage of R signal.
- Set MPX S.G. to L signal, and Output Selector SW. to R ch. (leakage of L signal appears on V.T.V.M.) Then, confirm that the leakage is within 2 dB for R-L.

CIRCUIT DIAGRAM

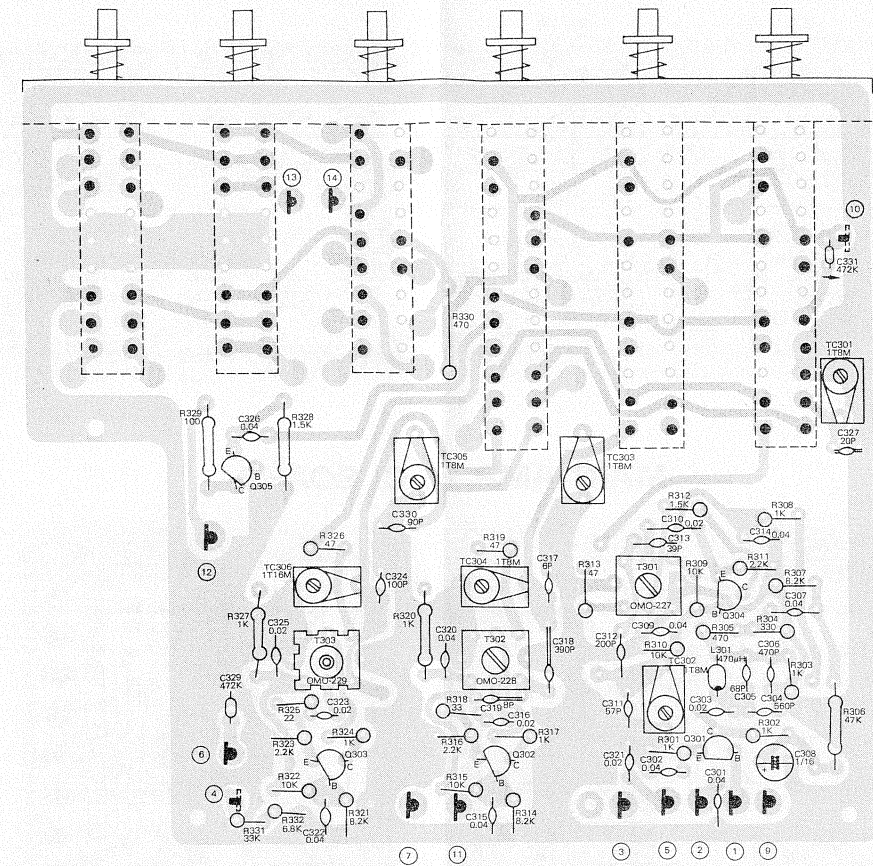


PARTS LIST

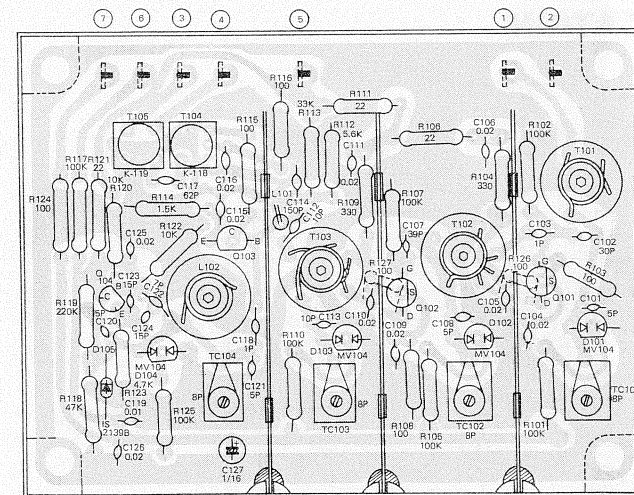
(Standard Parts Resistors, Capacitors are not listed here)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
A. Front Deck Parts (See PARTS LOCATION)					
	R610363B	Front Deck		R633210	MPX P.C Board Holder
VR004A	R361111	Slide Variable Resistor	C024, 025		Electrolytic Capacitor 50V 4700μF
VR004B			C026		Electrolytic Capacitor 50V 2200μF
VR003A	R361112	Slide Variable Resistor	C027		Electrolytic Capacitor 50V 1000μF
VR003B			VR007		Variable Resistor with V.C.
VR002A	R361113	Slide Variable Resistor	VC001, 002	R261023	(Variable Capacitance with VR)
VR002B				R811263	Pulley
VR001A				R633211	VC. Holder
VR001B			VR005	R382024	Semi Fixed Resistor B50K
S001A~F	R429060	Push Switch	VR006	R382026	Semi Fixed Resistor B10K
S003A~G	R429061	Push Switch	S004, 005	H425020	AC Line Voltage Selector Switch
S002A~B	R429062	Push Switch		H850211	Switch Mask
S004	R429063	Preset Mechanism		H430028	Fuse Holder
	R860612	Preset Dial	L003	R180267	SW Antenna Coil
J008	R439000	Head Phone Jack		R62653	Core Holder-B
	R633203	Head Phone Jack Holder		R633212	Antenna Holder-C
S004	R429064	Power Switch		R633213	Lamp Holder-B
	R830507	Indicator Cover		R633058	Fuse Holder-B
L002		Power Indicator Lamp		R633214	Lamp Holder-A
L003	R411045	Meter Lamp		H667051	Small Pulley-E
L001	R411046	Stereo Indicator Lamp		R633215	Pulley Holder-A
M901	R590059	Tuning Meter		H667053	Small Pulley-G
	R633226	Meter Lamp Holder		R633216	Fly Wheel Guide
	R671073A	Fly Wheel Ass'y		G43057	P.C.B. Terminal
	R871299A	Fly Wheel Knob	T001	R110135	Power Transformer
	R871300	Fly Wheel Decoration Cover		R633217	Transformer Holder-A
	R820121	Bearing		R633218	Transformer Holder-B
		E. Type Ring		R811213	Spacer
	R651728	Bearing Holder		R700301	Pulley Spring 3.5φ x 12t
	R633204	Pulley Holder-B		R877091	Dial Pointer
	H667052	Small Pulley-F		H850105	Dial Pointer Felt
	R860613	Dial		R411025	Lamp of Fuse Type
				R651758	Reinforce Metal Fittings
B. Rear Deck Parts (See PARTS LOCATION)					
	R610364	Rear Deck	D802, 803		3A 400V Rectifier
	R422036	Phono Selector Switch (Slide Switch)	804, 805		
	R439021	FM Antenna Socket	RL901	R421048	MY2-D DC 24V Relay
	R439022	AM Antenna Socket		R651727A	Heat Sink
	R811071	Cord Stopper		R651726A	Heat Sink Holder
	H920011	G.N.D Terminal Screw	D. Cabinet Parts (See Figure 1.)		
	R434003	Fuse Holder		R840651	Upper Cabinet
	R633205	Protector Circuit P.C Board Holder		R840676	Lower Cabinet
	R633206	Antenna Holder-A		R851387	Punching board-A
	R633207	Antenna Holder-B		R851388	Punching board-B
	R811262	Core Holder-A		R820200	Stopper Plate-A
L001, 002	R180266	LW. MW. Ant Coil		R820201	Stopper Plate-B
	R651339	Antenna Ring		R820202A	Stopper Plate-C
	R830551	Ring Stopper-A		R811264	Panel
	R820215	Antenna Cord Bushing		R811265	Dial Window
				R811210	Felt foot
C. Center Deck Parts				R651656	Mounting Metal for Cabinet
	R610364	Center Deck		R871301	Push Switch Knob
	R651729	Tuner Case		R871303	Slide Knob
	R651731	Tuner Case Cover		R871302	Power Switch Knob
	R651732	Lock Pin			
	R633209	AM, IF P.C Board Holder			

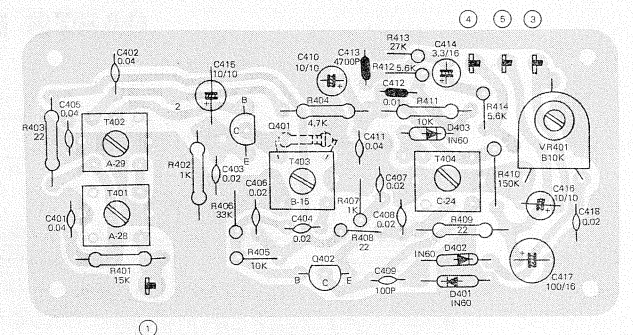
AM TUNER P. C. BOARD



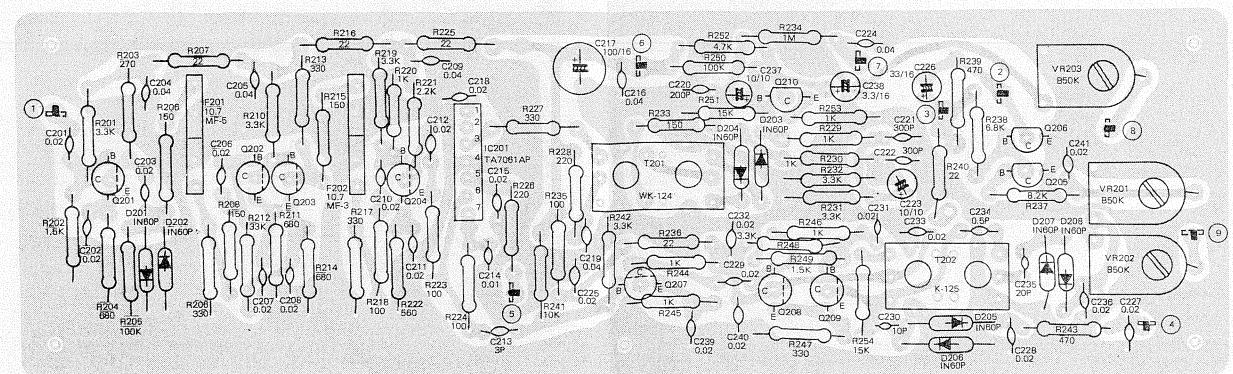
FM TUNER P. C. BOARD



AM IF P. C. BOARD



FM IF P. C. BOARD



[illegible][illegible]

ANTENNA RING
RING STOPPER-A
MW ANTENNA COIL
G.N.D. TERMINAL SCREW L002
DIN JACK LB5 TYPE
PHONO SELECTOR SWITCH (SLIDE SWITCH)
AM ANTENNA SOCKET
FM ANTENNA SOCKET
IN PUT P.C. BOARD
HEAT SINK
HEAT SINK HOLDER
POWER TRANSISTOR#4
ANTENNA CORD BUSHING
P.T. P.C. BOARD HOLDER
FUSE P.C. BOARD-A
TRANSISTOR SOCKET#4
FUSE HOLDER (H430028) x4
MAIN AMP P.C. BOARD
REINFORCE METAL FITTINGS
FUSE HOLDER x4
MPX P.C. BOARD
MPX P.C. BOARD HOLDER
AM IF P.C. BOARD
AM IF P.C. BOARD
PULLEY
VC HOLDER
SMALL PULLEY-E
LAMP HOLDER-A
METER LAMP HOLDER
HEADPHONE JACK HOLDER
TUNING METER M801
METER LAMP L003 12V 0.085A
TREBLE CONTROL VR002A VR002B
BASS CONTROL VR001A VR001B
DIAL
DIAL POINTER
DIAL POINTER FELT
PUSH SWITCH KN08x15
BALANCE CONTROL VR003A VR003B
VOLUME CONTROL VR004A VR004B
MUTING SW S003A S003B
AFC
S003C
S003D
S003E
S003F
S003G
S003H
S003I
S003J
S003K
S003L
S003M
S003N
S003O
S003P
S003Q
S003R
S003S
S003T
S003U
S003V
S003W
S003X
S003Y
S003Z
S003AA
S003AB
S003AC
S003AD
S003AE
S003AF
S003AG
S003AH
S003AI
S003AJ
S003AK
S003AL
S003AM
S003AN
S003AO
S003AP
S003AQ
S003AR
S003AS
S003AT
S003AU
S003AV
S003AW
S003AX
S003AY
S003AZ
S003BA
S003BB
S003BC
S003BD
S003BE
S003BF
S003BG
S003BH
S003BI
S003BJ
S003BK
S003BL
S003BM
S003BN
S003BO
S003BP
S003BQ
S003BR
S003BS
S003BT
S003BU
S003BV
S003BW
S003BX
S003BY
S003BZ
S003CA
S003CB
S003CC
S003CD
S003CE
S003CF
S003CG
S003CH
S003CI
S003CJ
S003CK
S003CL
S003CM
S003CN
S003CO
S003CP
S003CQ
S003CR
S003CS
S003CT
S003CU
S003CV
S003CW
S003CX
S003CY
S003CZ
S003DA
S003DB
S003DC
S003DD
S003DE
S003DF
S003DG
S003DH
S003DI
S003DJ
S003DK
S003DL
S003DM
S003DN
S003DO
S003DP
S003DQ
S003DR
S003DS
S003DT
S003DU
S003DV
S003DW
S003DX
S003DY
S003DZ
S003EA
S003EB
S003EC
S003ED
S003EE
S003EF
S003EG
S003EH
S003EI
S003EJ
S003EK
S003EL
S003EM
S003EN
S003EO
S003EP
S003EQ
S003ER
S003ES
S003ET
S003EU
S003EV
S003EW
S003EX
S003EY
S003EZ
S003FA
S003FB
S003FC
S003FD
S003FE
S003FF
S003FG
S003FH
S003FI
S003FJ
S003FK
S003FL
S003FM
S003FN
S003FO
S003FP
S003FQ
S003FR
S003FS
S003FT
S003FU
S003FV
S003FW
S003FX
S003FY
S003FZ
S003GA
S003GB
S003GC
S003GD
S003GE
S003GF
S003GG
S003GH
S003GI
S003GJ
S003GK
S003GL
S003GM
S003GN
S003GO
S003GP
S003GQ
S003GR
S003GS
S003GT
S003GU
S003GV
S003GW
S003GX
S003GY
S003GZ
S003HA
S003HB
S003HC
S003HD
S003HE
S003HF
S003HG
S003HH
S003HI
S003HJ
S003HK
S003HL
S003HM
S003HN
S003HO
S003HP
S003HQ
S003HR
S003HS
S003HT
S003HU
S003HV
S003HW
S003HX
S003HY
S003HZ
S003IA
S003IB
S003IC
S003ID
S003IE
S003IF
S003IG
S003IH
S003II
S003IJ
S003IK
S003IL
S003IM
S003IN
S003IO
S003IP
S003IQ
S003IR
S003IS
S003IT
S003IU
S003IV
S003IW
S003IX
S003IY
S003IZ
S003JA
S003JB
S003JC
S003JD
S003JE
S003JF
S003JG
S003JH
S003JI
S003JJ
S003JK
S003JL
S003JM
S003JN
S003JO
S003JP
S003JQ
S003JR
S003JS
S003JT
S003JU
S003JV
S003JW
S003JX
S003JY
S003JZ
S003KA
S003KB
S003KC
S003KD
S003KE
S003KF
S003KG
S003KH
S003KI
S003KJ
S003KK
S003KL
S003KM
S003KN
S003KO
S003KP
S003KQ
S003KR
S003KS
S003KT
S003KU
S003KV
S003KW
S003KX
S003KY
S003KZ
S003LA
S003LB
S003LC
S003LD
S003LE
S003LF
S003LG
S003LH
S003LI
S003LJ
S003LK
S003LL
S003LM
S003LN
S003LO
S003LP
S003LQ
S003LR
S003LS
S003LT
S003LU
S003LV
S003LW
S003LX
S003LY
S003LZ
S003MA
S003MB
S003MC
S003MD
S003ME
S003MF
S003MG
S003MH
S003MI
S003MJ
S003MK
S003ML
S003MN
S003MO
S003MP
S003MQ
S003MR
S003MS
S003MT
S003MU
S003MV
S003MW
S003MX
S003MY
S003MZ
S003NA
S003NB
S003NC
S003ND
S003NE
S003NF
S003NG
S003NH
S003NI
S003NJ
S003NK
S003NL
S003NM
S003NO
S003NP
S003NQ
S003NR
S003NS
S003NT
S003NU
S003NV
S003NW
S003NX
S003NY
S003NZ
S003OA
S003OB
S003OC
S003OD
S003OE
S003OF
S003OG
S003OH
S003OI
S003OJ
S003OK
S003OL
S003OM
S003ON
S003OO
S003OP
S003OQ
S003OR
S003OS
S003OT
S003OU
S003OV
S003OW
S003OX
S003OY
S003OZ
S003PA
S003PB
S003PC
S003PD
S003PE
S003PF
S003PG
S003PH
S003PI
S003PJ
S003PK
S003PL
S003PM
S003PN
S003PO
S003PP
S003PQ
S003PR
S003PS
S003PT
S003PU
S003PV
S003PW
S003PX
S003PY
S003PZ
S003QA
S003QB
S003QC
S003QD
S003QE
S003QF
S003QG
S003QH
S003QI
S003QJ
S003QK
S003QL
S003QM
S003QN
S003QO
S003QP
S003QQ
S003QR
S003QS
S003QT
S003QU
S003QV
S003QW
S003QX
S003QY
S003QZ
S003RA
S003RB
S003RC
S003RD
S003RE
S003RF
S003RG
S003RH
S003RI
S003RJ
S003RK
S003RL
S003RM
S003RN
S003RO
S003RP
S003RQ
S003RR
S003RS
S003RT
S003RU
S003RV
S003RW
S003RX
S003RY
S003RZ
S003SA
S003SB
S003SC
S003SD
S003SE
S003SF
S003SG
S003SH
S003SI
S003SJ
S003SK
S003SL
S003SM
S003SN
S003SO
S003SP
S003SQ
S003SR
S003SS
S0

The diagram illustrates a mechanical linkage system. A large wheel with spokes is shown. A pulley is mounted on the wheel. A spring is connected to the pulley and a lever arm. A small pulley is also shown. A belt or chain system is depicted, with various components labeled with numbers 1 through 18. Labels include 'PULLEY', 'PULLEY SPRING', 'EYELET', and 'SMALL PULLEY'. The system is connected to a 'DATA PRINTER'.

[illegible]